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Title of Invention: SEPARATOR FOR FLUIDS AND SOLIDS

Enclosed is a disclosure of the above-titled invention consisting of 7 sheets of description and - sheets of drawings. A check or money order in the amount of *10.00 is enclosed to cover the fee (37 CFR 1.21(c)). ENCLOSED CHARGE AUTHORIZATION

The undersigned, being a named inventor of the disclosed invention, requests that the enclosed papers be accepted under the Disclosure Document Program, and that they be preserved for a period of two years.

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CENTRIFUGAL FILTER

FIELD OF THE INVENTION

The present invention relates to a centrifugal filter.

BACKGROUND OF THE INVENTION

For separating particles from liquids, centrifuges with rotating barrels or travelling baskets are often used, in which the filtrate formed by the solid particles is retained as a residue on a filtering cloth or filtering bag. For the removal of residual layers from the barrel a mechanism is, for example, used therein which carries out a mechanical scraping of the barrel wall.

Such device have been found to be disadvantageous in view of the fact that the removal of residual layers is relatively involved.

It is therefore the object of the present invention to create a centrifugal filter which permits the efficient emptying of the travelling basket.

SUMMARY OF THE INVENTION

A significant advantage of the centrifugal filter according to the invention resides therein that, in contrast to known mechanical scraping blades which are unsuitable for scraping residual layers for example up to 4 or 5 mm in particular at the edges, they permit the complete emptying of the filtering cloth.

A further advantage of the centrifugal filter according to the invention is that, in contrast to the emptying scraping blades which destroy filtered-out crystals, it is exceptionally well suited for removing crystals carefully.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following the invention will be explained by example in further detail with reference to the drawings of which

FIG. **1** a schematic representation in section of a first embodiment of a centrifugal filter according to the invention,

FIG. **2** a schematic cross-sectional representation of the lifting device of such centrifugal filter,

FIG. **3** a schematic sectional representation of the collector chamber of this centrifugal filter,

FIG. **4** a schematic top view onto this collector chamber,

FIG. **5** a representation according to FIG. **1**, however, with filter cake,

FIG. **6** a representation according to FIG. **1**, however, with a filtering cloth stretched downwardly,

FIG. **7** a schematic representation in section according to a second embodiment of a centrifugal filter according to the invention, and

FIG. **8** a representation according to FIG. **7**, however, with a filtering cloth stretched upwardly.

The centrifugal filter according to FIG. **1** comprises a resting collector chamber **1** preferably realized in annular form, which rests over a machine body **2** on a support **3** and is closed with a cover **4**. Within the collector chamber **1** is disposed a travelling basket **5** with a barrel **6** and a travelling basket neck **7**. The machine body **2** encompasses a bearing housing **8** with fixed ribs **9** (FIG. **4**). In the bearing housing **8** are disposed a lower bearing **10** and an upper bearing **11**

for the drive shaft **12** of the travelling basket **5**. The upper part of the drive shaft **12** is connected with the shaft head **13** of a travelling basket hub **14** whose lower portion is connected with ribs **15** implemented in the lower portion of the travelling basket neck **7**. The barrel **6** of the travelling basket **5** is implemented so as to be approximately C-shaped and encompasses a center vertical barrel shell **16**, a lower barrel bottom **17** approximately radial and an upper annular barrel cover wall **18**, approximately radial. The barrel bottom **17** is implemented as a connection between the travelling basket neck **7** and the barrel shell **16**. The travelling basket **5** which consequently comprises the elements **18**, **16**, **17**, **7** (**15**), **14** (**13**), and **12**, is therefore supported in the centrifugal filter so as to be vertically rotatable via bearings **10** and **11**.

In the upper region of the barrel shell **16** is disposed in the interior an annular fastening device **19** for a filter element **20**, for example a filtering cloth or a filtering bag. The vertical portion of the travelling basket neck **7** and the vertical lower portion of the travelling basket hub **14** define an annular-cylindrical displacement volume into which a filter clamp device or lifting device can be partially shifted, comprising a vertical piston **23** and an outer fastening device **24** connected with it via radial ribs **25**, which can be, for example, a filter fastening ring.

The piston **23** is actuated electrically or hydraulically in order to move it in the vertical direction. For this purpose the drive shaft **12** can, for example, be connected via a hinge-rotary head **26** with corresponding fluidic connections **27**. The rotary head **26** comprises a packing head for two separate fluidic circulations **28**, in FIG. **1** only indicated, for transmitting fluid pressure from the stationary machine body **2** to the rotating drive shaft **12**. The pressure is carried through the drive shaft **12** and through the travelling basket hub **14** onto the piston **23**.

The upper portion of the centrifugal filter can be realized according to prior art with an oblique filling dish **29** or with a filling dish or with a filling tube.

FIG. **2** shows that the lifting device **22** can comprise, for example, five ribs **25**, which are congruent with the five ribs **15** of the travelling basket **5**. Between these ribs are present five passage openings **30**.

FIGS. **3** and **4** show that the outer portion of the collector chamber **1** is connected via three ribs **9** with the bearing housing **8**, and that between these three ribs **9** passage openings **30'** are present in order to make possible communication with the so-called product volume. Furthermore are provided two passage channels **31**, **31'**, isolated from the product volume, in which the drive belts for the motion of the drive shaft **12** are disposed.

The centrifugal filter according to FIGS. **1** to **6** functions in the following manner:

The barrel shell **16** is provided in the customary manner with holes, not depicted in the drawing so that the liquid can flow out by centrifugal force when the travelling basket **5** is rotated.

The supplied liquid containing solid particles in suspension is sprayed laterally at the bottom through centrifugal force from a potentially rotating ejector in the collector chamber **1**. Since barrel **6** also rotates, the liquid moves through the pores or mesh of the filtering cloth **20** or **20'** and through the holes of the barrel shell **16** into the collector chamber **1**, from which it can escape through the drainage tube **43** (FIG. **4**). Through the centrifugal force of the rotating barrel **6** the coating or cake formed by the solid particles is generated in the interior of the filtering cloth.

The filter element, filtering cloth or the like is held at the top by fastening device **19** (FIG. **1**) and at the bottom

through filter fastening ring **24**. In the normal position the filter fastening ring **24** is located in the upper region of the travelling basket neck **7**, as depicted in FIGS. **1** and **5**. The travelling basket **5** can be filled in the three ways mentioned above and FIG. **5** depicts the position of cake **32** if the barrel **6** is full. For emptying the centrifuge the travelling basket **5** is slowed down to emptying speed. Via a rotary button the lifting device **22** is pressurized with compressed gas or electrically and thereby brought into the lower final position so that the filter fastening ring **24** pulls the lower edge of the filter element **20** in the downward direction which is forced into a conical shape according to FIG. **6**. Through this mechanical deformation of the filter element the cake **32** (FIG. **5**) is detached which subsequently, due to gravity, slides through the passage openings **30** and **30'** from the machine which represents a very clean and fast operation. Subsequently the piston **23** is actuated in order to move it into its zero position (upper position) so that the next charging process can be started.

In the embodiment according to FIG. **7** and **8** the filter element is fixed below, for example in the upper region of the travelling basket neck **7** through a filter fastening device **33**. The filter element or filtering cloth, which in this case is also realized cylindrically, at least in a central region, so that it can rest in the interior of the travelling basket **5**, is fastened above with the aid of a fastening device **34** on a cover device **35** which covers the inner opening of an annular barrel cover wall **18'**. The collector chamber in this case is closed with a cover **4'** comprising a center tubular holding device **36** for a lifting body **37**, which comprises a lifting platform **38** and a longitudinal guidance **39** on which a guidance sleeve **40** for a filling tube **41** is rotatably supported. The holding device **36**, longitudinal guidance **39**, guidance sleeve **40** and the filling tube **41** are disposed coaxially with little free motion such that the guidance sleeve **40**, connected below with the cover device **35**, can rotate with it and, consequently, also with the travelling basket **5** even if parts **36**, **39** and **41** are at rest. For this purpose two axial bearings each are provided in the lower and in the upper region of this part. The platform **38** is connected movably via a mechanical, electrical, pneumatic or hydraulic mechanism **42** (FIG. **8**) with the holding device **36** or with the cover **4'** in such a way that the cover **35** can complete a vertical lifting motion in order to pull the filtering cloth **20'** upward (FIG. **8**). The operating function of the centrifugal filter according to FIGS. **7** and **8** is similar to the embodiments according to FIGS. **5** and **6** with the difference that the filter element is stretched upwardly.

The filtering cloth **20**, **20'** is preferable connected frictionally or detachably with the filter fastening ring **24** or **33** and with the fastening device **19** or **34** (FIG. **7**). Since the inner diameter of the barrel shell **16** (FIG. **1**) is greater than the outer diameter of the travelling basket neck **7**, it is possible for several longitudinal, at least approximately vertically directed, folds distributed over the circumference to develop in an at least approximately cylindrical filtering cloth **20** or **20'**. For this purpose, the filtering cloth is realized so as to be relatively flexible so that, due to the folds, it can be pressed more or less closely against the inner side of the barrel shell **16** through the centrifugal force.

The cover **4** or **4'** can be provided with a nitrogen inlet so that the collector chamber forms a completely closed system exposed to N_2.

In the centrifugal filter according to FIG. **1** or FIG. **7**, consequently, the height of the collector chamber **1** is greater than the height of the barrel shell **16**, in order to separate within the collector chamber **1** with the aid of the lifting device **22** or **42** the ring **24** or **34** from the barrel edge and to shift it so far downward or upward that the filtering cloth is completely stretched. The filtering cloth **20** or **20'** must be so flexible and dimensioned so that, in spite of its funnel form proper, assumed preferably through the folds, it can adapt well to the inner wall of the barrel shell **16**.

In a further embodiment of the invention the cover **4**, **4'** can be opened and subsequently shifted and/or pivoted laterally in order to permit opening the entire centrifugal filter.

The collector chamber **1** can be provided with a further opening in order to generate a vacuum so that the filtration can be accelerated. In this case, the nitrogen inlet can be closed or it can be omitted. It is understood that such openings can also be provided with valves.

In a further embodiment of the invention the collector chamber **1** and the travelling basket **5**, which according to prior art can comprise stainless steel in various qualities, are protected on the inside with a plastic coating comprising, for example, Teflon.

Between the filtering cloth **20** or **20'** and the barrel shell **6** a support net can be present. During the filtration the lower termination of the bearing arrangement can be closed with a covering not depicted in the Figures. Emptying the filtering clothing can also be carried out by shaking the clamping ring with the aid of the lifting device **22** or **42**.

In practice, for centrifugal filters of this type preferably filtering cloths can be used comprising polypropylene or Teflon having a thickness of for example 1 mm and a mesh size of 5 to 100 μm.

According to another embodiment of the invention the bearing of the travelling basket can be disposed on the outside between the machine body and the travelling basket neck which in this case comprises a center opening whose diameter is smaller than the inner diameter of the ball bearing, which can be used for example for supporting the travelling basket. Such support can comprise, for example, an upper ball bearing and a lower angular bearing. The travelling basket which, thus, is disposed so as to be rotatable about a vertical axis and whose neck is thus realized as hollow driving shaft, communicates via the center opening of the travelling basket neck with a lower emptying volume for the separated solid particles. In this embodiment a part of the lifting device can also be mounted stationarily on the outside so that it can also be actuated purely mechanically as shown in the example according to FIG. **7**.

It is evident from FIGS. **1**, **3**, **7**, and **8** that the travelling basket hub **14** can, for example, extend from the travelling basket neck **7** to a relatively high point in the inner region of the travelling basket.

We claim:

1. A centrifugal filter, comprising:

a) a collector chamber;

b) a machine body supporting said collector chamber;

c) a rotatable filter basket having a perforated barrel and a basket neck, said filter basket being disposed in the interior of the collector chamber;

d) a bearing housing having a bearing device comprising a rotatable drive shaft for the filter basket, said machine body having a portion supporting said bearing housing and having at least one opening;

e) a hub driven by said drive shaft and connected with a portion of said basket neck, wherein said portion of said basket neck has at least one basket neck bottom opening;

f) a filter element having a first edge connected with the filter basket; and

g) lifting means to which is connected a second edge of said filter element so as to move said second edge in a direction between a folded position of said filter element and a stretched position of said filter element.

2. The centrifugal filter as defined in claim 1, wherein the connection of said second edge of said filter element to said lifting means defines a space which together with said at least one opening of said portion of said basket neck defines a passage of said basket neck.

3. The centrifugal filter as defined in claim 2, wherein the connection of said second edge of said filter element to said lifting means comprise connection ribs forming spaces between them which together with the opening of the portion of said basket neck defines said passage of said basket neck.

4. The centrifugal filter as defined in claim 1, wherein the portion of the basket neck comprises ribs which form spaces therebetween which are openings of said filter basket neck portion.

5. The centrifugal filter as defined in claim 1, wherein the portion of said machine body supporting said bearing housing comprises a plurality of ribs forming spaces therebetween which are openings of said portion of the machine body.

6. The centrifugal filter as defined in claim 1, wherein said first edge of the filter element is connected via a first fastening device with the filter basket and said second edge of the filter element is connected via a second fastening device with a movable part of said lifting means.

7. The centrifugal filter as defined in claim 1, wherein the distance between said first fastening device and the lifting means is greater than the distance between said second fastening device and the lifting means.

8. The centrifugal filter as defined in claim 1, wherein said lifting means is coaxially disposed with respect to said basket hub and a first part of said lifting means is fixedly connected with said basket hub and a second part is movable and connected with the second edge of said filter element.

9. The centrifugal filter as defined in claim 1, wherein said basket hub comprises a shaft head for said drive shaft and at least one channel for a fluid actuating said lifting means.

10. The centrifugal filter as defined in claim 1, wherein the basket neck comprises an annular free space containing a movable part of said lifting means.

11. The centrifugal filter as defined in claim 1, wherein the lifting means is supported by a cover of the collector chamber.

12. The centrifugal filter as defined in claim 11, wherein a movable part of said lifting means is connected with a cover device for the filter basket and wherein the second edge of said filter element is connected to the filter basket.

13. The centrifugal filter as defined in claim 1, wherein said perforated barrel includes a perforated barrel shell and a barrel bottom implemented as a connection between said barrel shell and said basket neck and wherein the diameter of the perforated barrel shell is greater than the diameter of the basket neck.

14. The centrifugal filter as defined in claim 1, wherein said lifting means is a hydraulically actuated piston device.

15. The centrifugal filter as defined in claim 1, wherein said lifting means is an electrically actuated piston device.

16. The centrifugal filter as defined in claim 1, wherein said lifting means is a pneumatically actuated piston device.

17. The centrifugal filter as defined in claim 1, wherein the filter element is a filtering cloth or bag fixed in the upper region of the perforated barrel.

18. The centrifugal filter as defined in claim 1, wherein the filter element is a filtering cloth or bag.

19. The centrifugal filter as defined in claim 1, wherein the machine body has two isolated passage channels in which drive belts for the motion of the drive shaft are disposed.

20. The centrifugal filter as defined in claim 1, wherein the collector chamber is closed with a cover including a center tubular holding device for a lifting body which comprises a lifting platform and a longitudinal guide on which a guide sleeve for a filling tube is rotatable supported, and wherein the guide sleeve is connected with the connection connecting said second edge of said filter element with said lifting body.

21. The centrifugal filter as defined in claim 1, wherein the collector chamber is connected to a drainage tube.

* * * * *

USES FOR THE PARTICULANT EXTRACTOR

The Particulant Extractor has three separate and different applications in the automotive field - two of them being major antipollution processes. It also has other environmental applications - one of which is in the capturing of industrial smoke stack contaminants (pollution), the other being in the clean-up of accidental oil spills in lakes, rivers and oceans. It can also be used to separate water from compressed air - which is utilized in various industrial fields, professional or amateur painting applications and with any type of air tools such as found in dentists offices or automotive maintenance shops etc.

AUTOMOTIVE USES

The first of the three automotive uses is as an oil extractor.

Oil Extractor Primary Function:

Hot oil latent gases from the engine head, after passing through the PCV Valve, are diverted to the oil extractor. The extractor gleans and extracts the oil from the hot gases (thereby removing pollutants) before they can be reintroduced into the engine at the intake where the gases are then burned and churned into the atmosphere through the exhaust. The oil extracted is returned to the engine for use as a lubricant as originally intended.

Oil Extractor Secondary Function:

Is to increase combustion efficiency – power and gas mileage. The increase in efficiency is attained because the gases are cleaned and cooled before introduction into the intake thereby creating a cleaner burn.

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May 2, 2001

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Re: "SEPARATOR FOR FLUIDS AND SOLIDS"
Applicant: Jorge L. Lombana
Our file No. 21068

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1. Form PTO/SB/95 (**Disclosure Document Deposit Request**) original and one copy to be returned to our office along with the stamped envelop as soon as it is recorded with a serial number;
2. self-addressed, postage-paid envelope; and
3. description and drawing of the invention.

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